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# Scrutiny of Risks Factors in Construction Projects

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**Abstract:** *The construction industry is widely associated with a high risk and uncertainty due to the nature of its operating environment. This study aims to identify and evaluate key risk factors and their frequency and severity and then their impact in different types of construction projects in India.*

*A questionnaire survey was conducted and a total of sixty five critical factors were identified and categorized into eight groups. These are: Financial related risk, Legal related risk, Management risk, Market related risk, Political and security related risk, Technical related risk, Environmental related risk, and Social related risk.. The results are presented on the basis of their frequency, severity and importance.*

**Keywords:** *Risks, Project Risk Management, Relative important index, F.I.Index, S.I Index, I.I Index*

## I. INTRODUCTION

The aim of this study is to conclude the prospect factors in industry, allotment of these factors, strategies used to traumatize risks and thus the techniques adopted in analysing these risks. the development project is exposed to a high degree of risk from the start of the project till the highest of the project.

Risk is printed as any event or prevalence which could have an impact on the action of project goals. Risk management in construction comes is to deal effectively with uncertainty and sudden events that might have an impact on palmy and timely completion of the project.

If risks don't seem to be known early throughout a project, it creates tons of exposure and uncertainties to the project life cycle, thereby touching such aspects as value, schedule and quality of the project. additionally, it'd additionally produce exposures within the space of Health, safety and surroundings.

Hence, risk management permits project managers to identify, analyze, respond and manage the risks of the project. this will be the rationale why risk management is extremely necessary for the palmy action for a project.

In drafting the contract, the getting strategy need to clearly outline the responsibilities of the consumer and therefore the contractor and such need to be specific and graspable. this will be to make positive that the prospect is clear for every the contractor and shopper thereby avoid future dispute.

The importance of risk management in construction comes are reportable by many authors. It had been completed that risk management is crucial to construction activities in minimizing losses and enhancing profitableness.

It had been explicit that risk management might be a way that need to be applied in associate trade to achieve the goals of the trade, thus it is necessary to unfold awareness and build interest amongst individuals to use risk management techniques within the trade. the prospect might be a measurable a neighborhood of uncertainty and is assumed as a deviation from the specified level, thus the prospect analysis is thus necessary for project choice and coordination of construction work.

## II. OBJECTIVES

The main objectives of this study include the following:

- A. To identify the causes of risks in construction projects.
- B. To minimize the effect of risks in construction project..
- C. Ranking of the risk factors in accordance of their frequency, severity and importance.

### III. LITERATURE REVIEW

Table 1

Past	Title of Research
2010	Yasser Abdelghany, A.Samer Ezeidin- This paper focuses on the analysis of the different ICJV risk environments.
2011	Hong-bo Zhou, S.e. M.ASCE and Hui Zhang- This methodology has five main parts: modeling of BNs, determination of occurrence probabilities of risk events, assessment of consequences, calculations of risk value and membership degree of risk rating, and definitions of risk acceptance criteria.
2012	Hariharan Subramanyan, Priyadarshi H. Sawant and Vandana Bhatt - The risk response strategy suggested in this paper will be useful in mitigating the adverse effects of risk in project completion in the Indian construction industry.
2013	Muhammad Saiful Islam - The main attention was paid to the identification of different types of risk and rating the various risks arises in a project and assessing major risk factors. Besides, this research developed a risk management framework for proper management of Bangladeshi construction projects.
2015	Shahid Iqbal et al. - This study is based on findings of a questionnaire-based survey on risk management in construction projects in Pakistan, reporting the significance of different type of risk, ultimate responsibility for them and the effectiveness of some most common risk management techniques practiced in the industry
2016	Greeshma R Krishnan, Minu Anna Johny - Proper management of all these processes is quite challenging for the management team. Risk is nothing but the threats that occur during the project life cycle. Risk may be of various kinds. There are various factors which affects the occurrence of these risks.
2017	Paweł Szymański - The risk is present everywhere, in every area of life. One such area is the construction industry, where risk is ever-present element of a great puzzle. Effective risk management does not apply to the resignation of the risk, which is seemingly the cheapest option activity.
2018	Dr. Chaiwat Pooworakulchai –This article studied the main application to risk management in the construction industry by the sample texts document.
2019	Ahsan Nawaz et al.- Risk management is a comparatively new field and there is no core system of risk management in the construction industries of developing countries

### IV. METHODOLOGY

A questionnaire survey was conducted by construction professionals representing various stakeholders involved in construction projects in India

#### A. Questionnaire Design

The questionnaire was designed based on critical factors were identified that contributed to the causes of risks. A questionnaire survey was developed to assess the perceptions of various construction professionals of the relative importance of causes and the effects of construction risks. The questionnaire was designed into two sections: Section A; section B. Section A is to obtain the requested background information about the respondents. Section B is to obtain information on the factors that contribute to the causes of risks in construction projects from the perspective of construction professionals. A total sixty seven resources related factors were identified under three broad categories, namely manpower related, material related and equipment related issues. The critical factors are listed in Table 1. A five point Likert scale (1 very low, 2 low, 3 moderate, 4 high, 5 very high) was adopted where respondents were asked to rank the importance and impact of a particular factor on risks in one of their selected projects. Descriptive statistical techniques, namely Relative Importance Index (RII) has been used to highlight the relative importance of critical factors as perceived by the respondents (Assaf et. al, 1995; Faridi and El-Sayegh, 2006; Iyer and Jha, 2005; kmaraswamy and Chan, 1998).

#### B. Analysis of Data

The data obtained was analyses to determine the relative importance of the various factors that contribute to causes of construction delays.

**C. Relative Importance Index (RII)**

Assess the relative significance among risks, previous literature work study suggests establishing a risk significance index by calculating a significance score for each risk. For Calculating the significance score, multiply the probability of occurrence by the degree of Impact. The significance score for each risk assessed by each respondent can be obtained through the model

$$S_j^i = A_j^i * B_j^i$$

Where  $S_{ij}$  = Significance score assessed by respondent j for risk i

$A_{ij}$  = Occurrence of risk i, assessed by respondent j

$B_{ij}$  = degree of impact of risk I, assessed by respondent j.

By averaging scores from every one of the reactions, it is conceivable to get a normal importance score for each hazard, and this normal score is known as the hazard record score and is utilized for positioning the dangers. The model for the figuring of hazard list score can be characterized as

$$R_s^i = \sum_j^T = 1 S_j^i / T$$

Where  $R_s^i$  = index score for risk i

$S_j^i$  = Significance score assessed by respondent j for risk i

T= total number of responses

**D. Design of the Survey**

The respondents were requested to judge the total risk effect of each risk factor. The approach adopted is to consider two attributes for each risk: the probability level of the risk occurrence denoted by Frequency Index (F.I) and the degree of impact or the level of loss if the risk occurs denoted by Severity Index (S.I).By applying this approach, the respondents were asked to respond to the two attributes for each risk factor. For considering (F.I), the respondents were required to judge the probability level of risk occurrence by selecting one from among five levels, namely: Very small, Small, Normal, large, and Very Large. For considering (S.I) the respondents were asked to judge the degree of impact if the risk concerned occurs by selecting one from among five grades, namely: Very Low, Low, medium, High, and Very high.

**E. Analysis Of Survey Results**

To assess the relative significance among risks, previous literature study suggests establishing a risk significance index by calculating a significance score for each risk. For calculating the significance score is to multiply the probability of occurrence by the degree of impact. Thus, the significance score for each risk assessed by each respondent can be obtained

**V. DATA ANALYSIS**

Descriptive and frequency statistical analysis techniques were used to analyze the data collected in the survey. However, an advanced and accurate method is necessary to analyze the data in a systematic, fast and reliable way. For this purpose, the computer software Statistical Package for Social Science (SPSS 16) and MS Excel were selected.

The data collected from the survey were analyzed using the frequency and severity index method (Assaf and Al-Hejji, 2006) [5]. Details of both frequency and severity index analysis are explained below.

According to Assaf and Al-Hejji (2006), a formula as shown in equation (1) was used to rank risk factors based on frequency of occurrence as identified by the participants, which is called the Frequency Index (F.I).

$$\text{Frequency Index (F. I.)}(\%) = \frac{\sum a(n/N)}{5} \times 100 \quad (1)$$

Where (a) is the constant expressing weighting given to each response (ranges from 1 for very small up to 5 for very high occurrence), n is the frequency of the responses, and N is the total number of responses. Similarly, a formula as shown in equation (2) used to rank risk factors based on severity index as indicated by the participants, which is called Severity Index (S.I).

$$\text{Severity Index (S. I.)}(\%) = \frac{\sum a(n/N)}{5} \times 100 \quad (2)$$

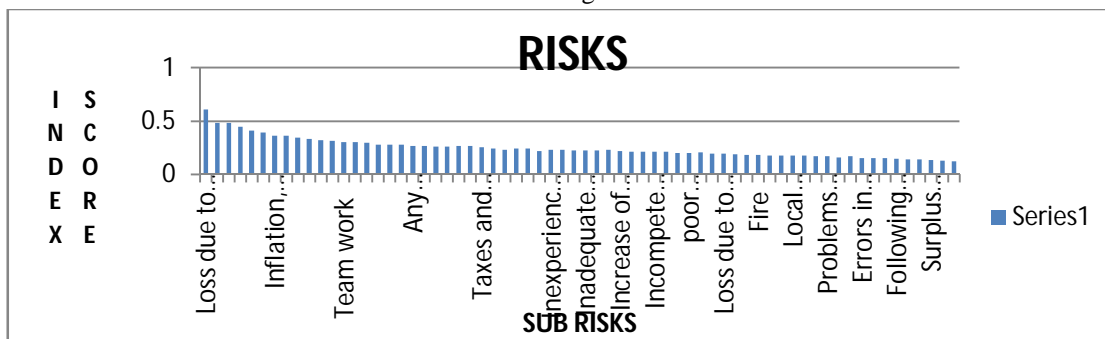


TABLE 3

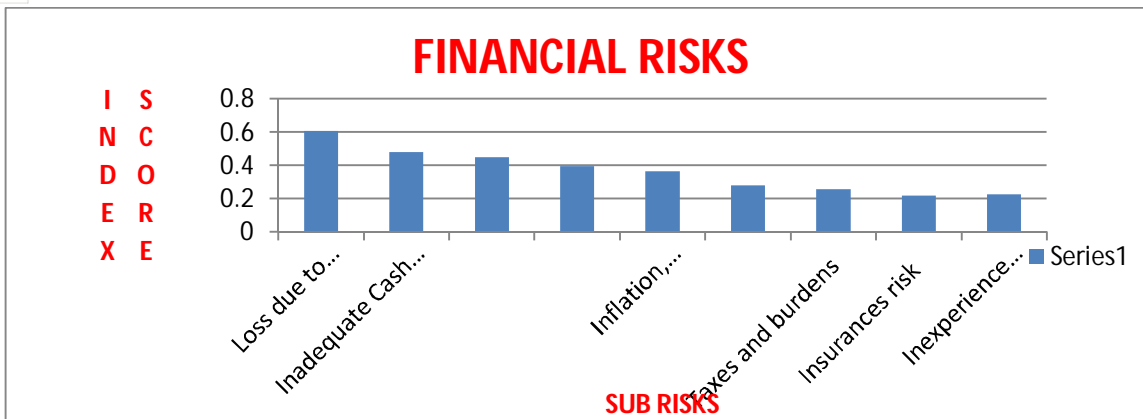
Ranking of Risk			
S.No	Risks	Index Score	Rank order
1	Loss due to Fluctuation of interest rate	0.608	1
2	High degree of difficulty in construction	0.482	2
3	Inadequate Cash Flow	0.48	3
4	Low credibility of shareholder and lender	0.448	4
5	Resettlement and rehabilitation of people	0.408	5
6	Change in bank formalities and lenders	0.394	6
7	Inflation, Availability of foreign currency & Exchange Rate change	0.365	7
8	Breach of contract by project partner	0.362	8
9	Lack of enforcement of legal judgment	0.342	9
10	Improper project feasibility study	0.331	10
11	Problems due to adjacent or nearby projects	0.32	11
12	Time constraint	0.314	12
13	Team work	0.3	13
14	Project delay	0.3	14
15	Uncertainty and unfairness of court justice	0.294	15
16	Loss due to rise in fuel prices	0.28	16
17	Loss due to rise in fuel prices	0.28	17
18	Local people support for the project	0.28	18
19	Any adverse impact on project due to climatic conditions	0.265	19
20	Cost increase due to changes of Govt policies	0.268	20
21	Competition from other similar projects	0.26	21
22	Competition from other similar projects	0.26	22
23	No past experience in similar project	0.268	23
24	Any adverse impact on project due to climatic conditions	0.265	24
25	Taxes and burdens	0.257	25
26	Collapse and Land Slide	0.2428	26
27	Accidents on site	0.231	27
28	Improper verification of contract document	0.242	28
29	Shortage of skillful workers	0.24	29
30	Insurances risk	0.22	30
31	Inexperience when pricing tenders	0.228	31
32	Change of top management	0.228	32
33	Increase of resettlement costs	0.222	33
34	Inadequate forecast about market demand	0.225	34
35	Loss incurred due to political changes	0.225	35
36	Obsolescence of building equipment	0.228	36
37	Increase of materials price	0.217	37
38	Floods	0.211	38
39	Any impact on the environment due to the project	0.211	39
40	Incompetence of transportation facilities	0.211	40
41	Fall short of expected income from project	0.211	41
42	Inclement Weather	0.202	42
43	poor quality of procured materials	0.2	43

44	Increase of labour costs	0.205	44
45	Earthquake	0.197	45
46	Loss due to bureaucracy for late approvals	0.194	46
47	Short tender time	0.188	47
48	Poor relation and disputes with partner	0.18	48
49	Fire	0.18	49
50	Insufficient Detailing	0.177	50
51	Internal management problem	0.177	51
52	Local protectionism	0.177	52
53	Design changes	0.174	53
54	War and Civil disorders	0.171	54
55	Problems with Licenses	0.171	55
56	Unfairness in tendering	0.16	56
57	Equipment failure	0.168	57
58	Errors in design drawings	0.154	58
59	Industrial disputes	0.151	59
60	Unknown site physical conditions	0.151	60
61	Following government standards and codes	0.145	61
62	Materials shortage	0.142	62
63	Site distance from urban area	0.142	63
64	Surplus materials handling	0.134	64
65	Wastage of materials by workers	0.128	65
66	Architect Vs Structural Engineer dispute	0.12	66

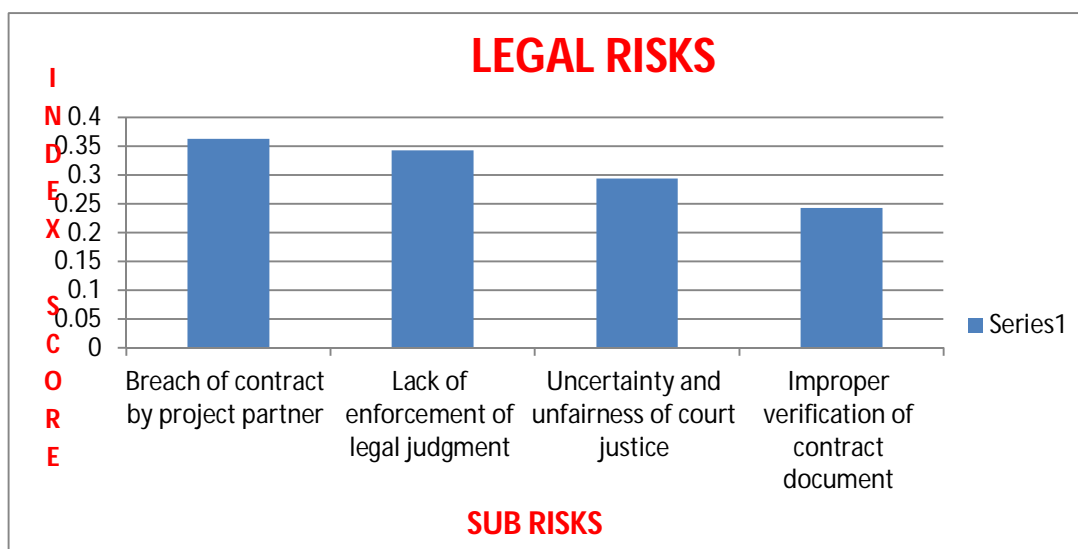
Ranking of Risk



FINANCIAL RISKS	Index Score(□)
Loss due to Fluctuation of interest rate	0.608
Inadequate Cash Flow	0.48
Low credibility of shareholder and lender	0.448
Change in bank formalities and lenders	0.394
Inflation, Availability of foreign currency & Exchange Rate change	0.365
Loss due to rise in fuel prices	0.28
Taxes and burdens	0.257
Insurances risk	0.22
Inexperience when pricing tenders	0.228

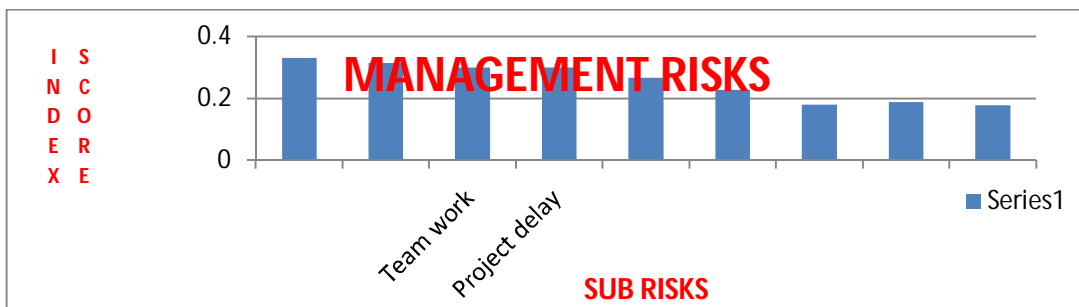


LEGAL RISKS	Index Score(□)
Breach of contract by project partner	0.362
Lack of enforcement of legal judgment	0.342
Uncertainty and unfairness of court justice	0.294
Improper verification of contract document	0.242

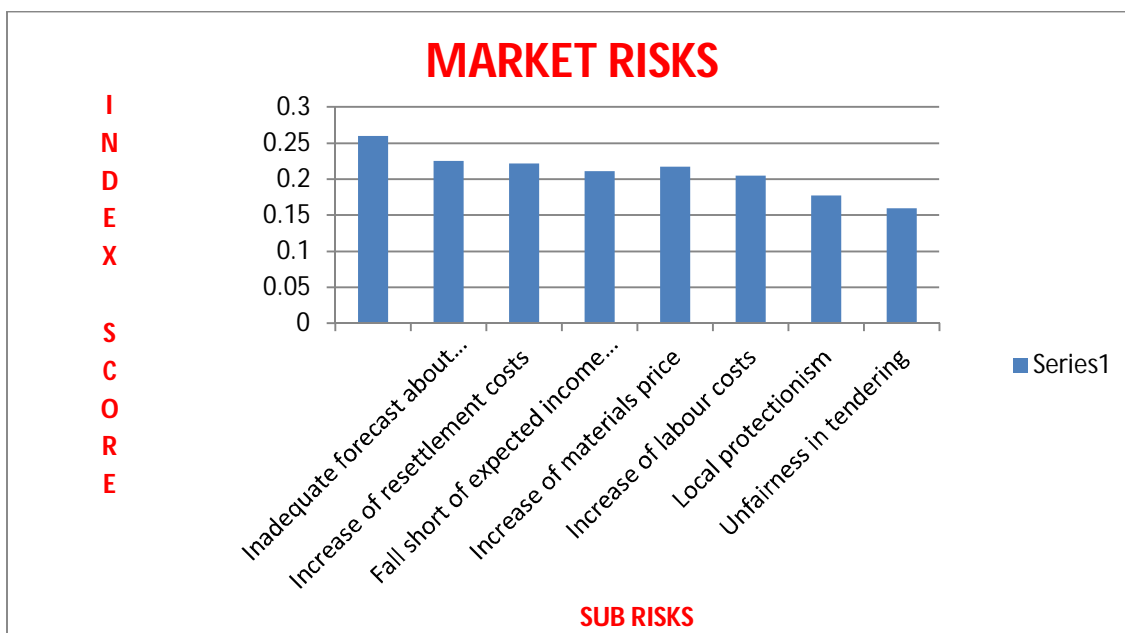


Management Risk	Index Score(□)
Improper project feasibility study	0.331
Time constraint	0.314
Team work	0.3
Project delay	0.3
No past experience in similar project	0.268
Change of top management	0.228
Poor relation and disputes with partner	0.18
Short tender time	0.188
Internal management problem	0.177

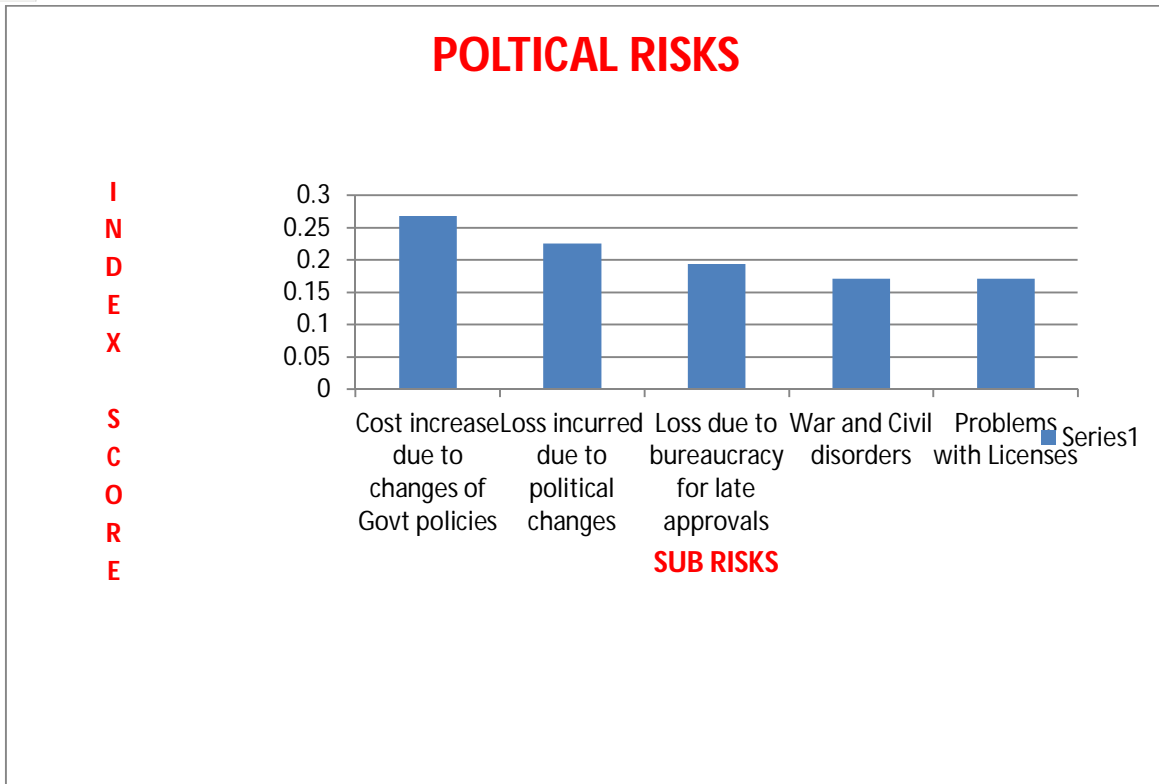




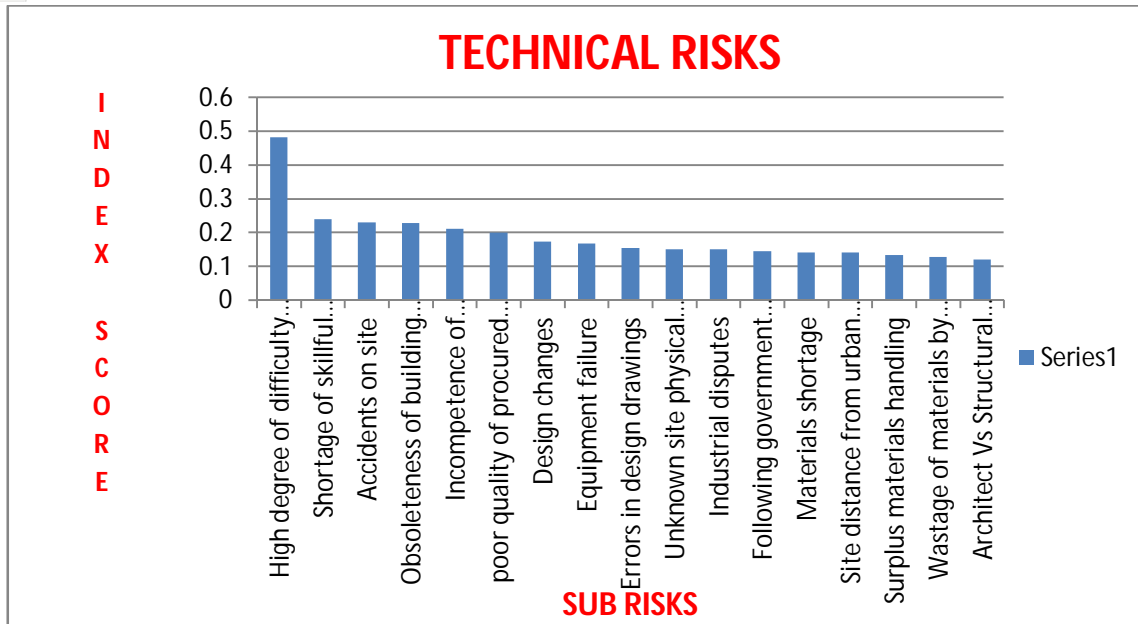
Market Risk	Index Score(□)
Competition from other similar projects	0.26
Inadequate forecast about market demand	0.225
Increase of resettlement costs	0.222
Fall short of expected income from project	0.211
Increase of materials price	0.217
Increase of labour costs	0.205
Local protectionism	0.177



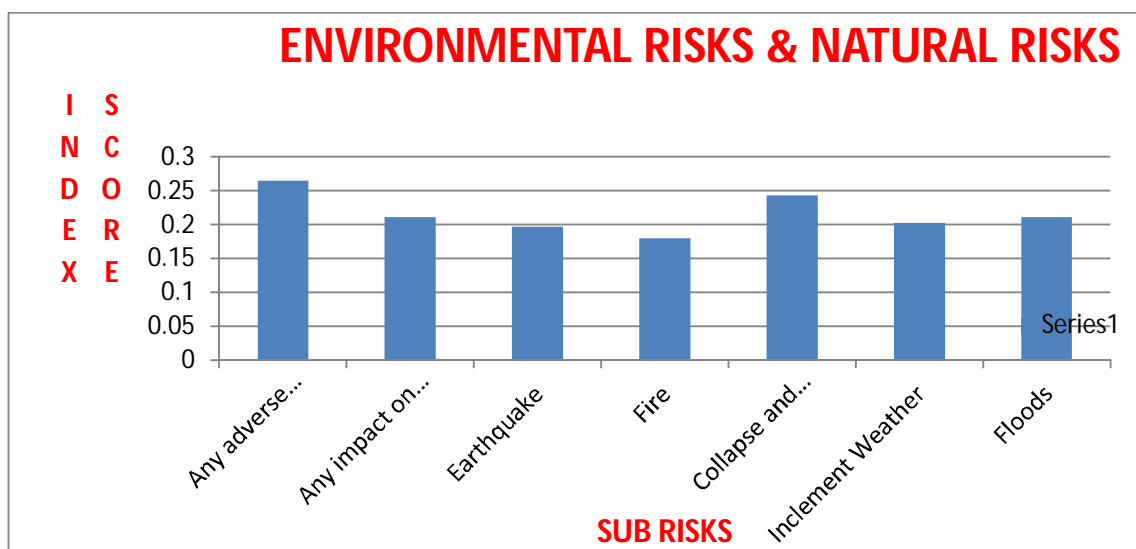
Political Risk	Index Score(□)
Cost increase due to changes of Govt policies	0.268
Loss incurred due to political changes	0.225
Loss due to bureaucracy for late approvals	0.194
War and Civil disorders	0.171
Problems with Licenses	0.171



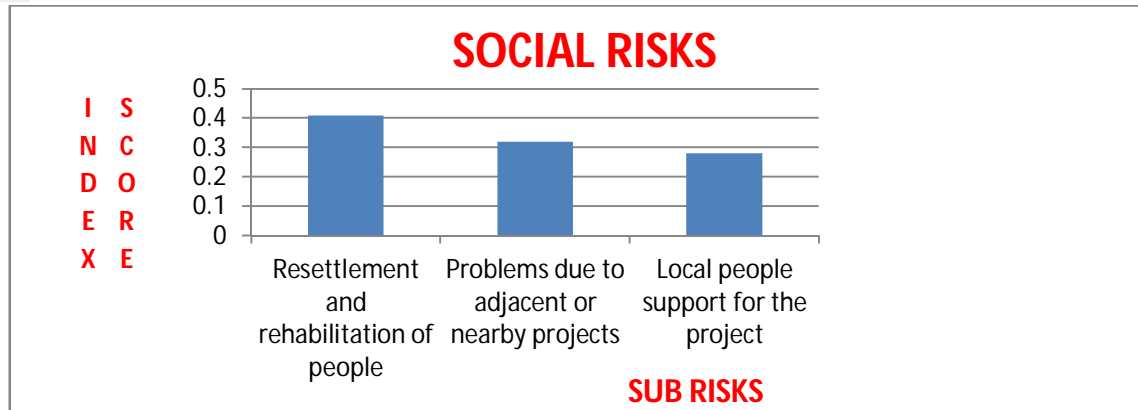
Technical Risk	Index Score(□)
High degree of difficulty in construction	0.482
Shortage of skillful workers	0.24
Accidents on site	0.231
Obsolescence of building equipment	0.228
Incompetence of transportation facilities	0.211
poor quality of procured materials	0.2
Design changes	0.174
Equipment failure	0.168
Errors in design drawings	0.154
Unknown site physical conditions	0.151
Industrial disputes	0.151
Following government standards and codes	0.145
Materials shortage	0.142
Site distance from urban area	0.142
Surplus materials handling	0.134
Wastage of materials by workers	0.128
Architect Vs Structural Engineer dispute	0.12



Environmental Risk & Natural Risk	Index Score(□)
Any adverse impact on project due to climatic conditions	0.265
Any impact on the environment due to the project	0.211
Earthquake	0.197
Fire	0.18
Collapse and Land Slide	0.2428
Inclement Weather	0.202
Floods	0.211



Social Risk	Index Score(□)
Resettlement and rehabilitation of people	0.408
Problems due to adjacent or nearby projects	0.32
Local people support for the project	0.28



## VI. CONCLUSION

In this study, identifying the risk factors faced by the construction industry is based on collecting information about construction risks, their consequences and corrective actions that may be done to prevent or mitigate the risk effects. The main point which was considered this research is to explore the key risk factors and identify these factors that could be faced in construction projects in India.

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